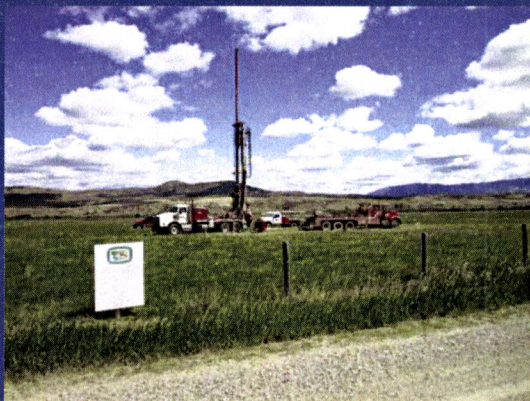


**Ground Water Investigation Program (GWIP - MBMG)
Exempt Well Discussion**

**Presented to the Water Policy Interim Committee
July 12, 2012**



**Presented by MBMG
John Wheaton**

**Preparation by:
Kirk Waren
Andy Bobst**

GWIP staff



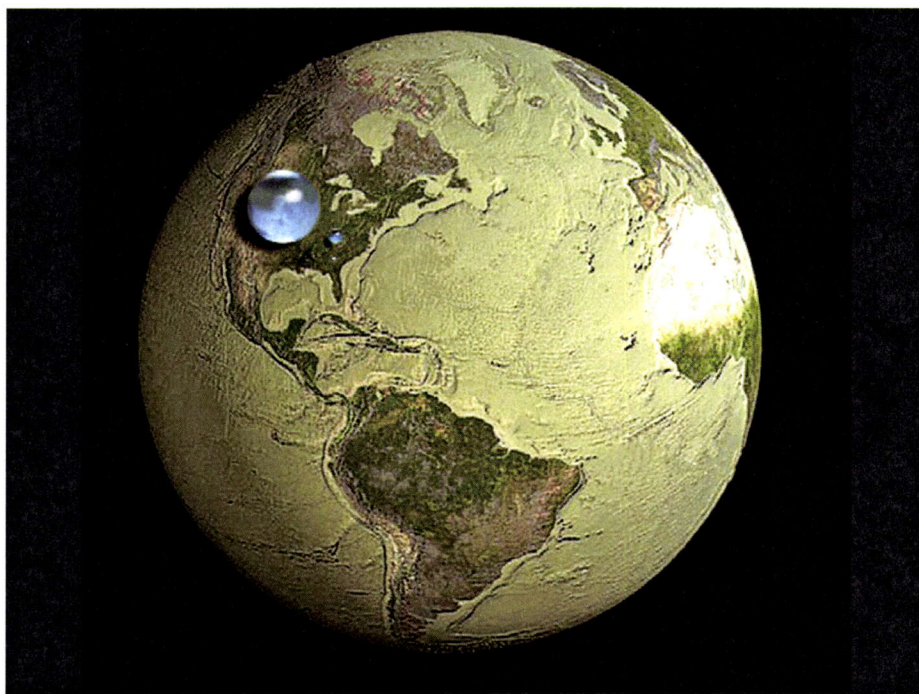
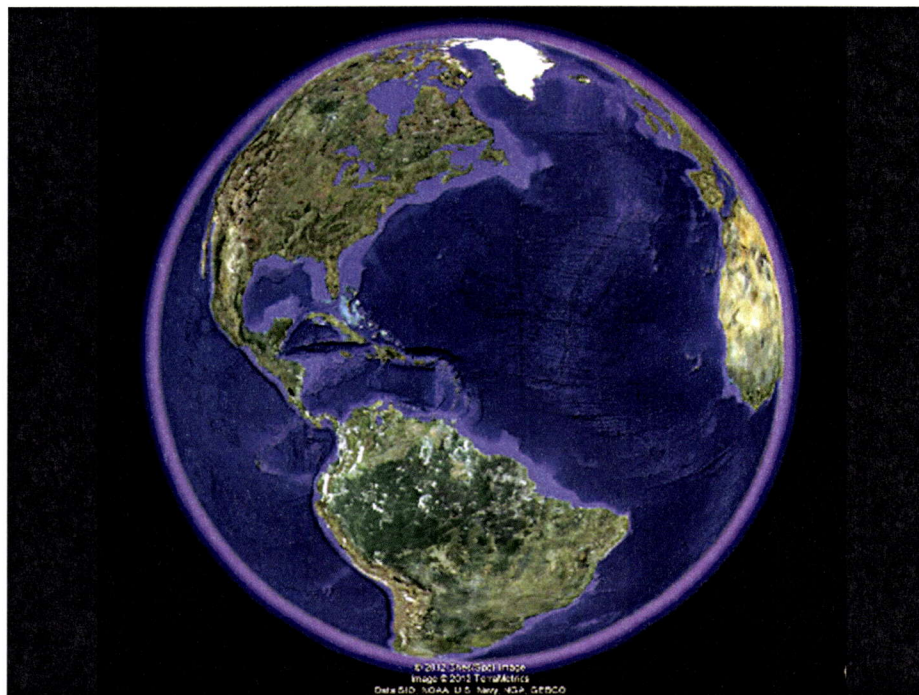
Overview from GWIP studies

Questions that were asked or comments made (paraphrased):

- Does irrigation recharge aquifers?
- Need more storage capacity.
- Watershed management affects available water.
- Is surface water connected to groundwater?
- One size does not fit all.
- Is there an existing impact from exempt wells?
- How much water is used by domestic wells?
- Use the science.

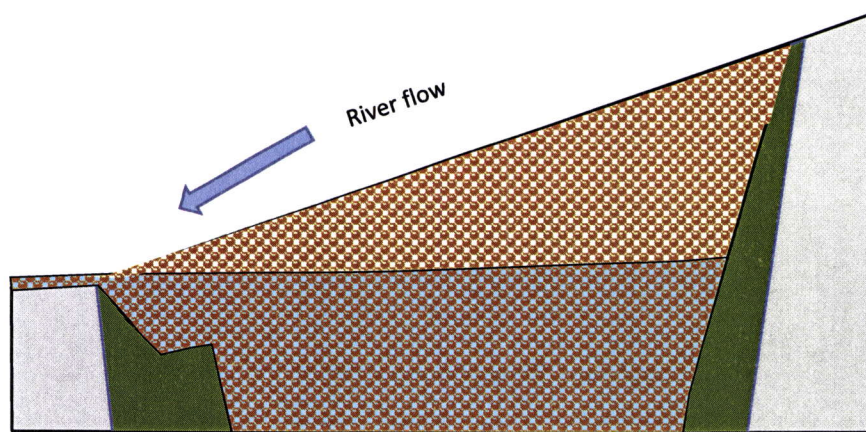
Three general categories:

1. Role of irrigation in watersheds
2. Quantity of water involved in exempt wells
3. The status of the science

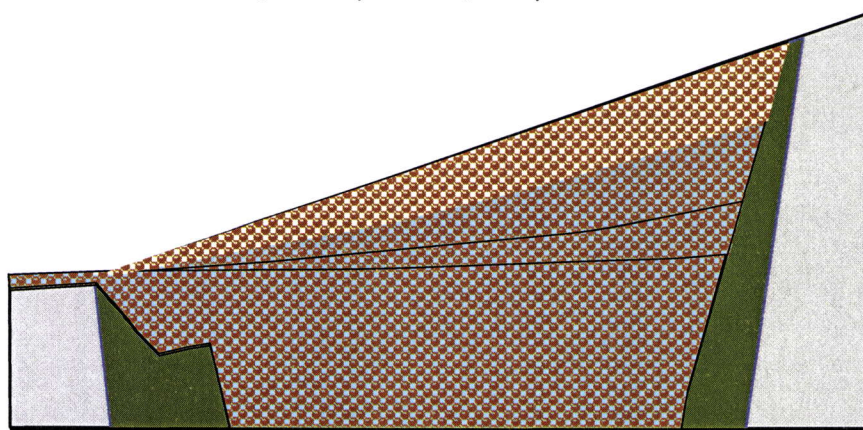


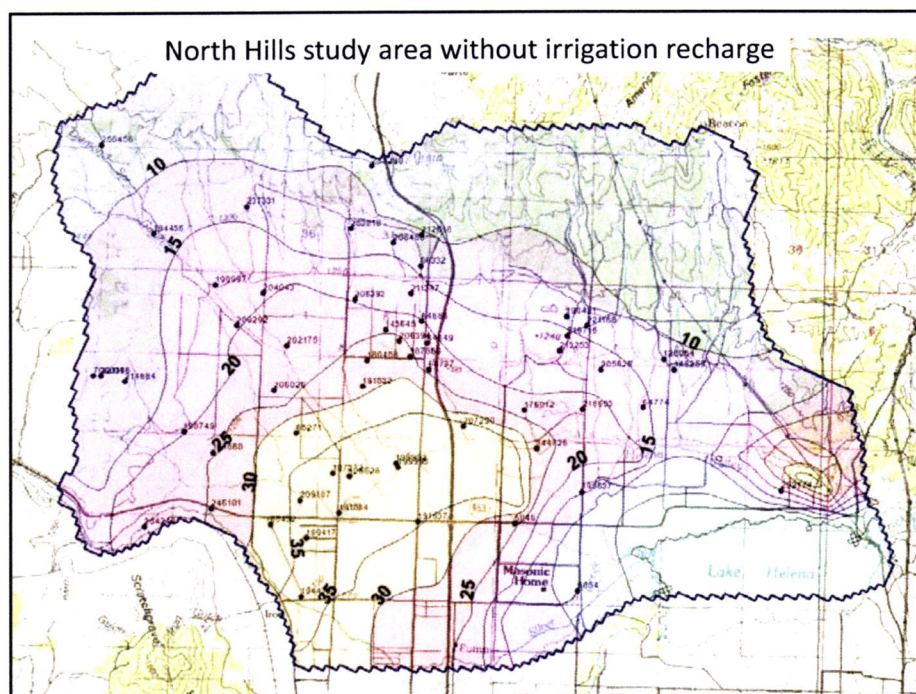
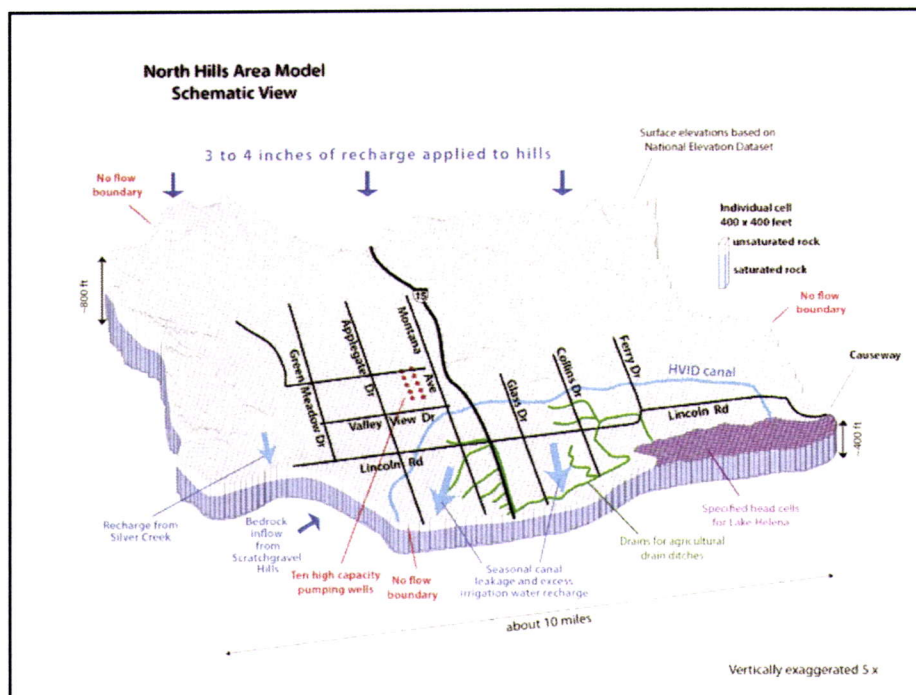
Groundwater levels in an altered watersheds in Western Montana

Longitudinal profile of a basin-fill valley

**Groundwater levels in an altered watersheds in Western Montana**

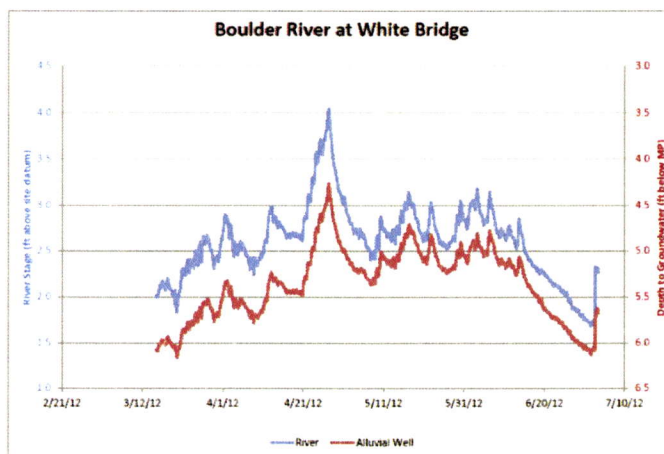
Transient adjustment to reduced irrigation recharge.
Headed toward a new, but not yet known, steady state.





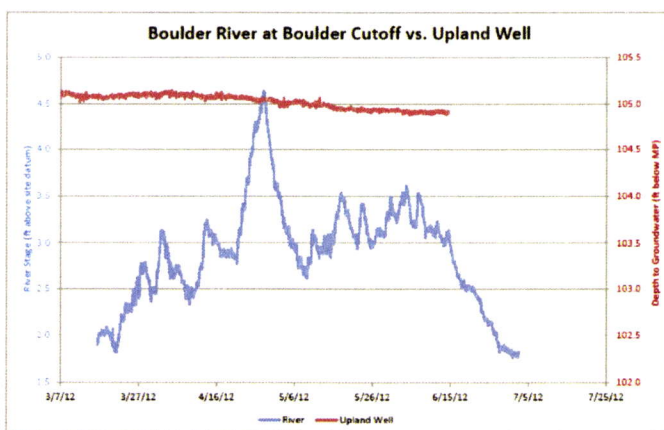
Aquifer Drawdown:

Are surface water and groundwater connected?



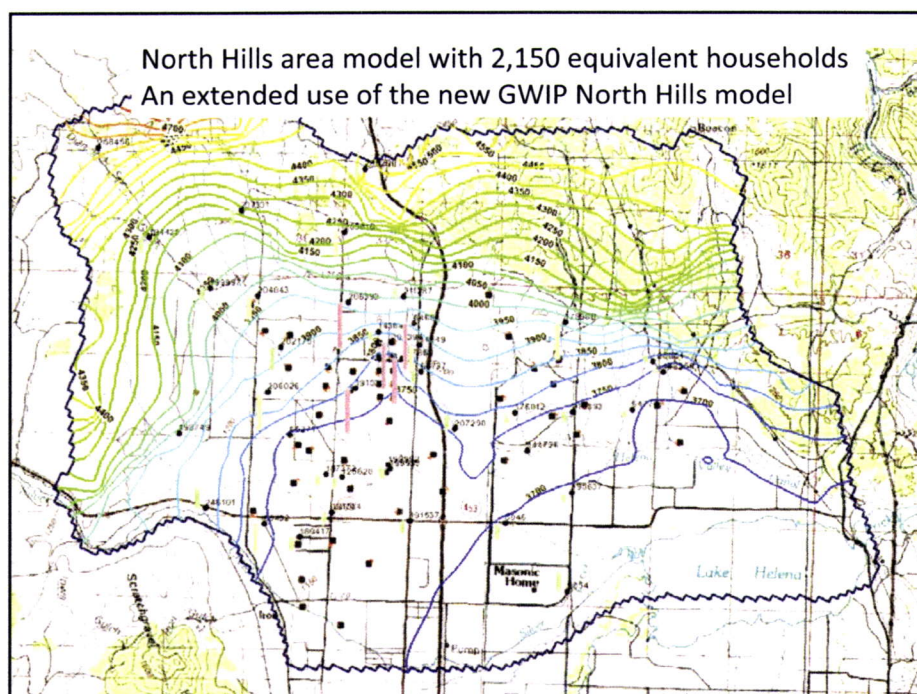
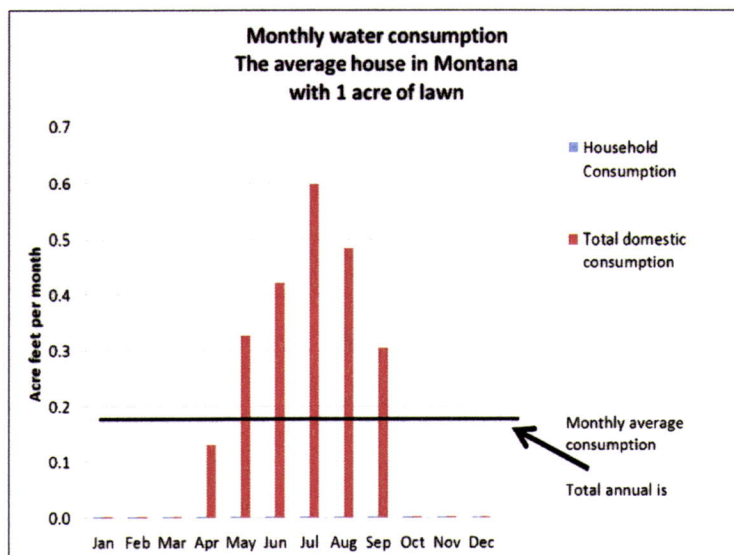
Aquifer Drawdown:

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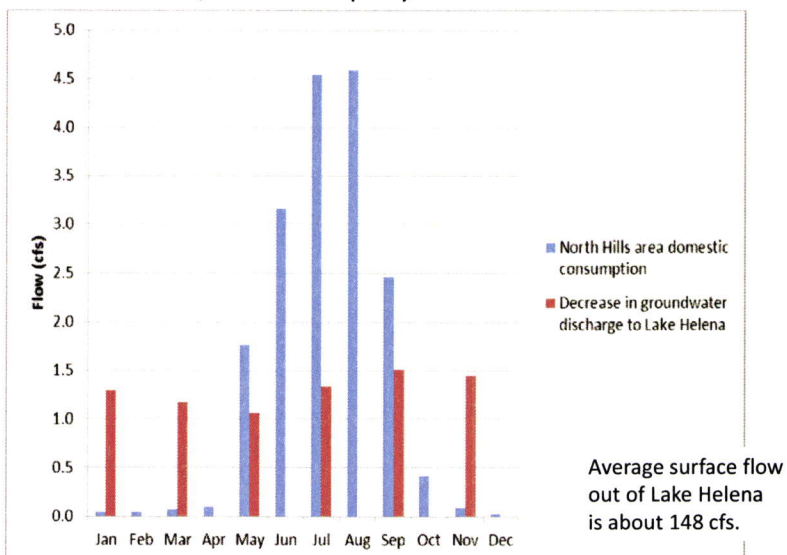


Quantity of water involved in exempt wells

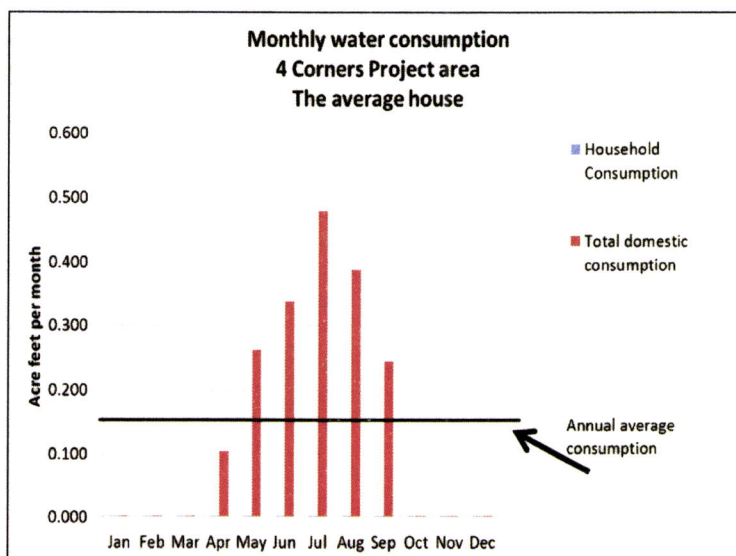
Domestic use : about 0.3 acre-feet per year
Lawn and garden use: about 2.0 ac-ft per acre



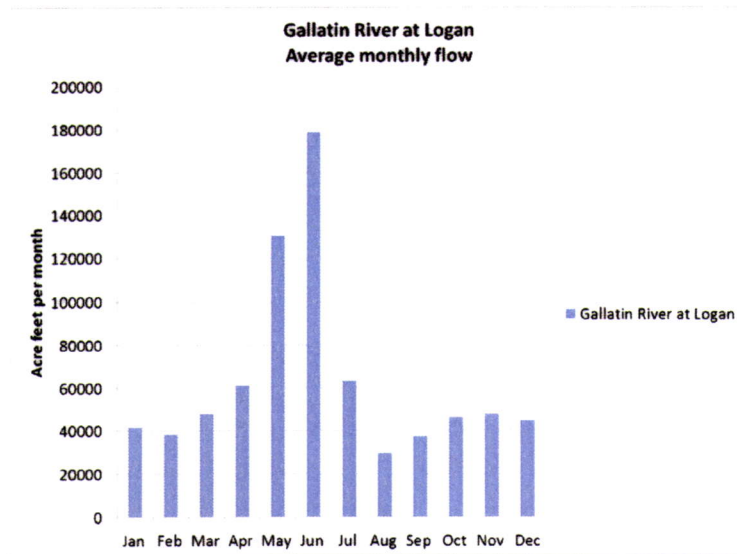
North Hills: 2,150 houses,
Cumulative: 1,048 acre-ft per year



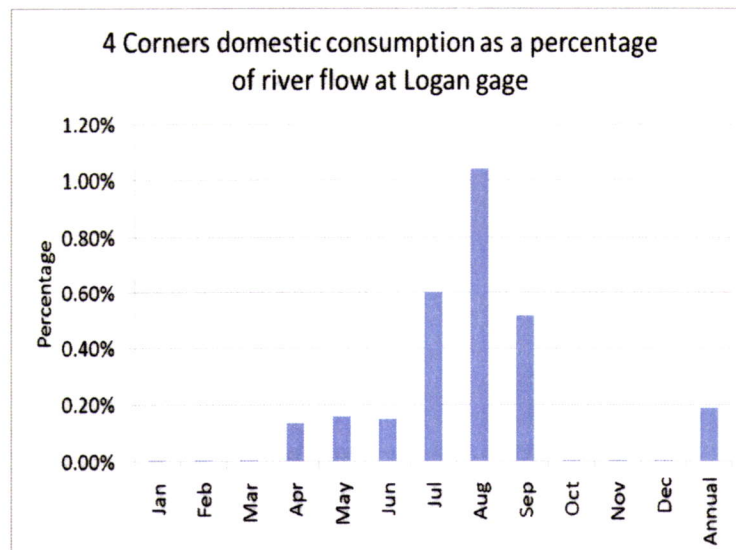
Water budgets: 4 Corners area, domestic well,
796 domestic users in study area each using about 1.8 ac-ft per year



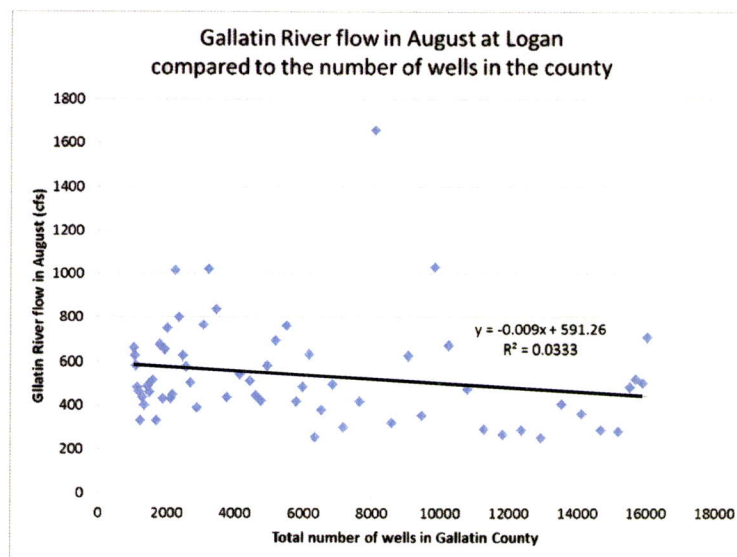
Water budgets: 4 Corners area, Gallatin River flow at the Logan gauge



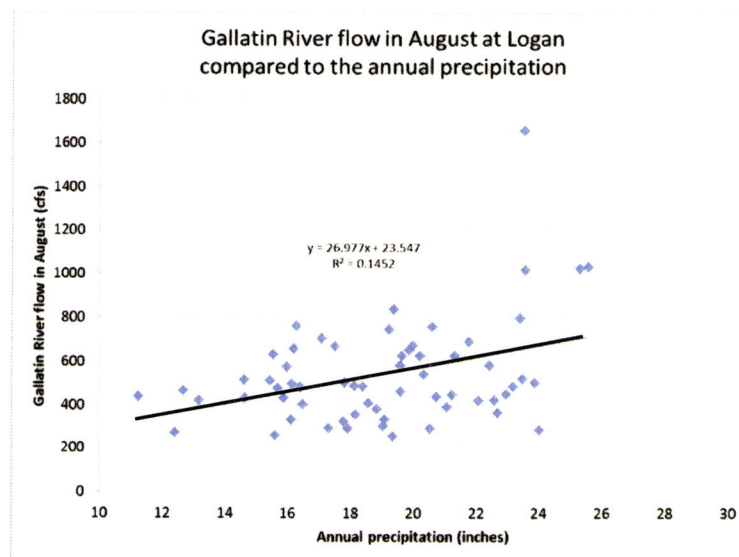
Water budgets: 4 Corners study area, 796 wells cumulative consumption versus Gallatin River



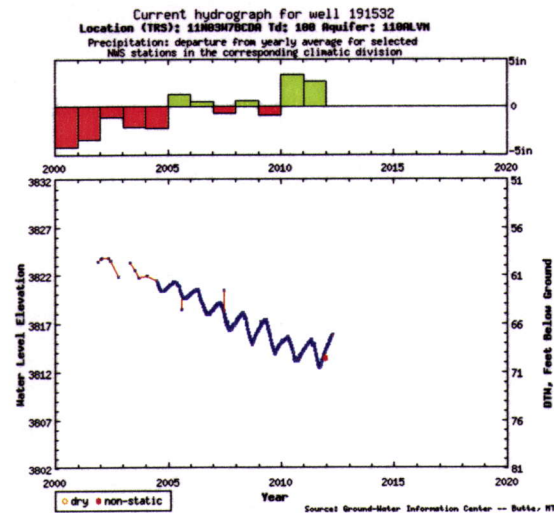
Water budgets: Gallatin River at Logan gauge, August monthly flow from 1950 to 2011 compared to the number of wells in the county each year.



Water budgets: Gallatin County, Logan gauge, August monthly



Aquifer Drawdown:
 Unconfined aquifer in North Hills study area
 Model predicts additional drawdown



The status of the science

Use the science was a recurring theme

- WPIC is setting that example
- John Metesh's exempt well report
- GWIP projects and updates
- Scientists other than MBMG testify before WPIC
- GWIC and GWAAMON provide data for the public
- The body of science is increasing and is becoming more focused on this issue.
- Not knowing a change exists is not the same as the change not existing.
- Science can describe the change, but not the significance.
- Good science is independent of opinion.
- GWIP recognizes and will address the need for more public educational presentations.